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EPI Consortium Meeting - 8 November 2022

Introduction

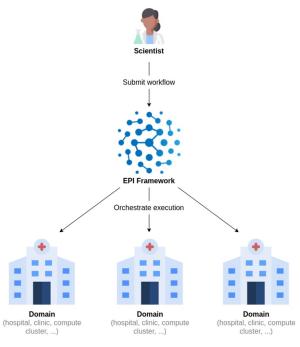
- EPI Framework

"Programmable orchestration of applications and networking in a sensitive

environment"

(RQ 5 & RQ 6)

- Workflow execution system
 - Workflows (i.e., scientific computing)
 - Packages / External functions
 - User -> Central node -> Worker nodes
- Composed of:
 - Brane
 - The Bridging Function Chain Re-assignment & Orchestration Framework (BRO)
 - (eFLINT) Policy reasoners



Previously in this theatre...

- Initializing Proof-of-Concept (PoC)
 - Rosanne's use-case (federated computation)
 - Three domains: UMC Utrecht, St. Antonius & SURF

- Initializing policy integration in EPI Framework
 - Introduce "Data" notion
 - Compile to workflows
 - Add eFLINT policy reasoner (checker)
 - Integrate BRO

Progress made

- Initializing Proof-of-Concept (PoC)
 - Rosanne's use-case (federated computation) ✓
 - Three domains: UMC Utrecht, St. Antonius & SURF

- Initializing policy integration in EPI Framework
 - Introduce "Data" notion
 - Compile to workflows
 - Add eFLINT policy reasoner (checker) ✓
 - Integrate BRO 🤡

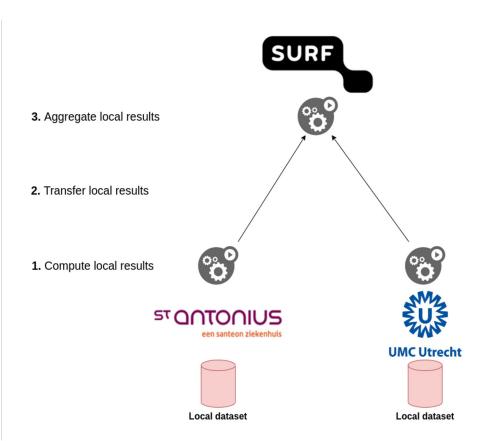
The PoC

The Goal

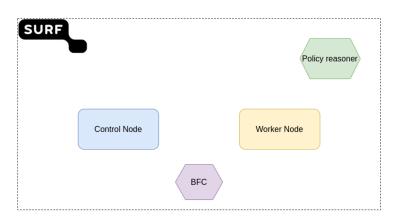
- **Preparation** for future use-cases
 - Rosanne's use-case (next slide)
 - Corinne's use-case
- **Testing** of EPI Framework
 - "In the wild"
 - Policy integration
 - Hospital security
- **Exploration** of policies
 - Data-level
 - Network-level

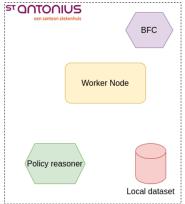
Use-case

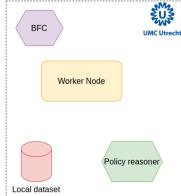
- Rosanne's use-case
- Stratified confidence sequence analysis for psychiatric treatments
- Infrastructure perspective:federated setup
- Test data (then ECT dataset)

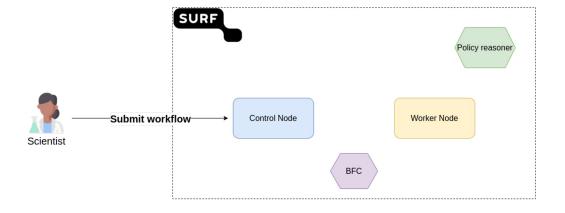


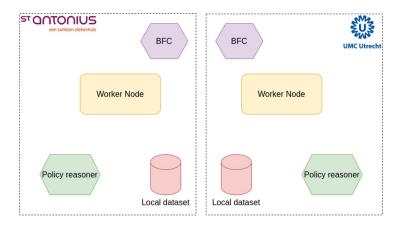




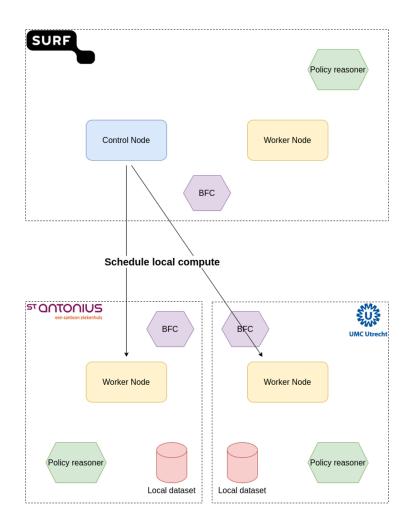




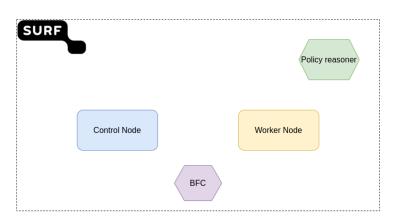


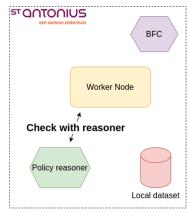


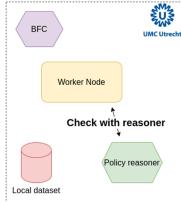




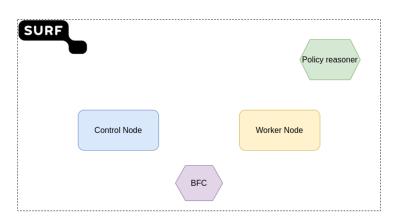


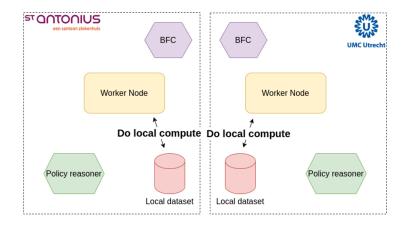




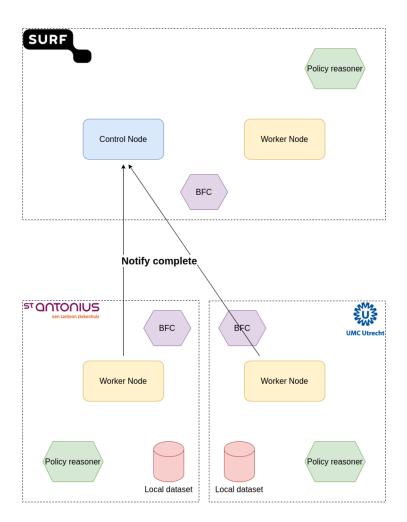




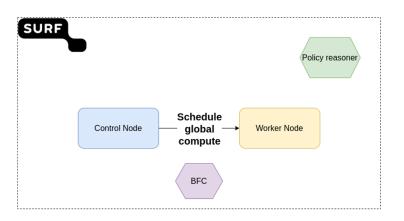


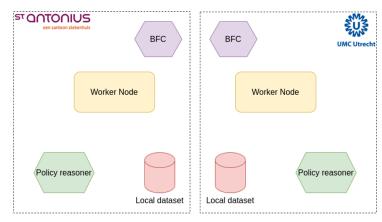




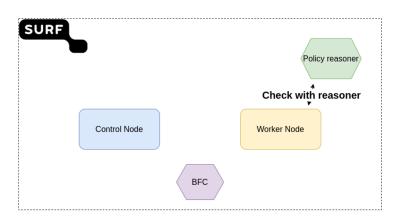


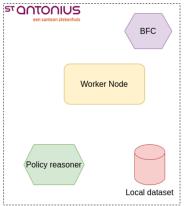


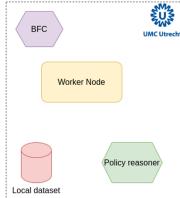




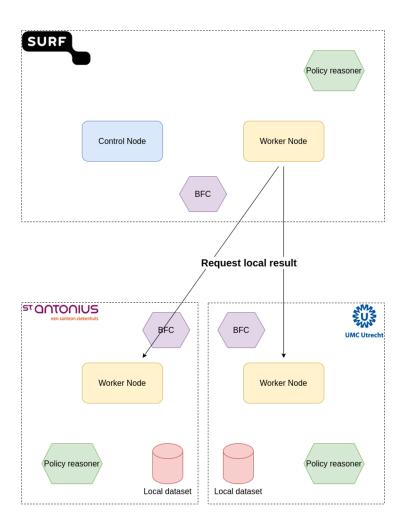




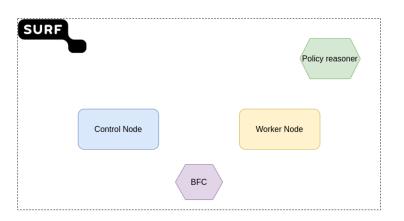


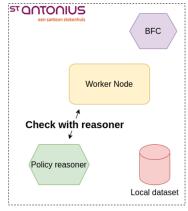


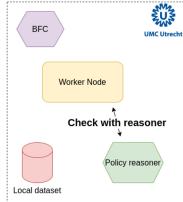




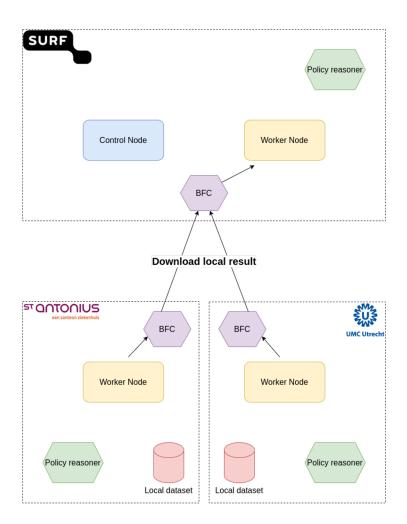




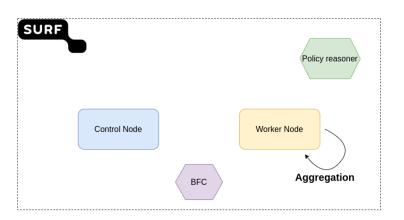


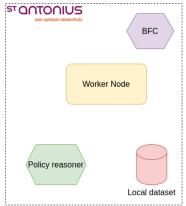


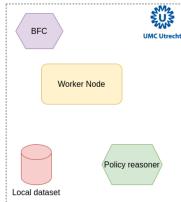




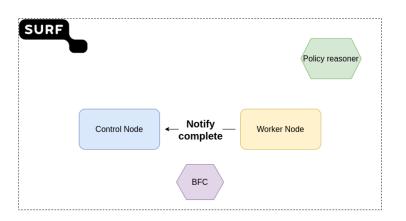


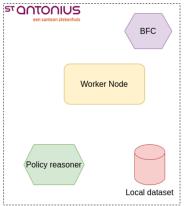


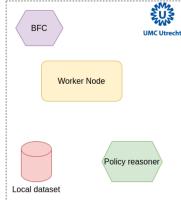


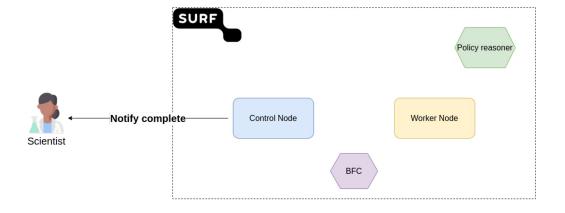


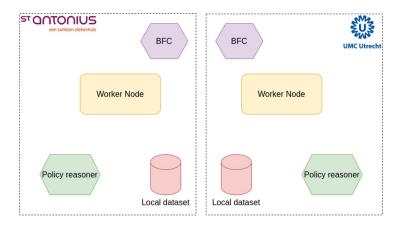


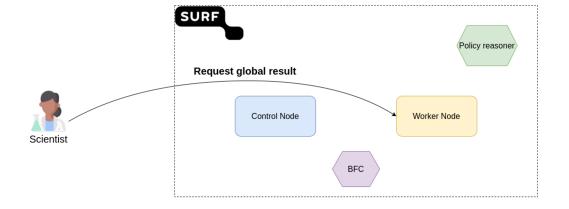


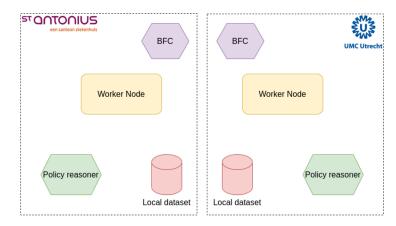




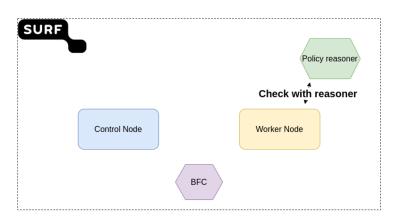


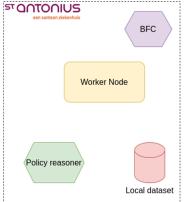


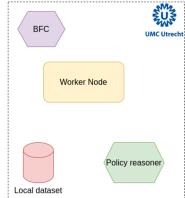


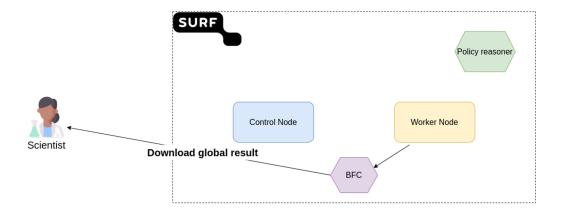


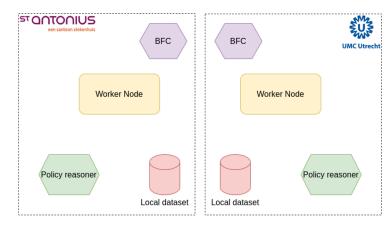




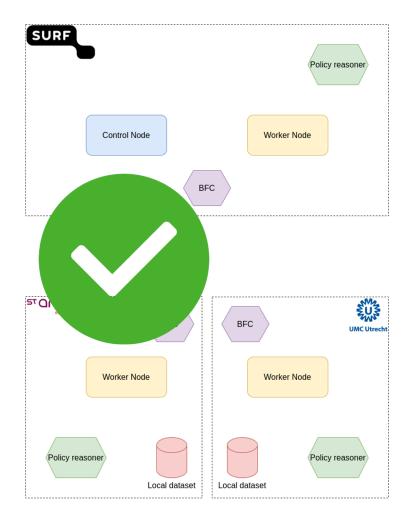












Status

- Rosanne's code is implemented in EPI Framework-format
- **The infrastructure** is almost there
 - St. Antonius gave access yesterday (to-be-tested)
 - UMC Utrecht had some delays, but working on it
- The framework is almost there

What's next

- Replace test dataset -> ECT dataset
 - No additional agreements/risk analysis required
 - Pentesting?
- Turning the PoC -> Use-case
 - Automatic execution
 - Automatic feedback of result (e.g., dashboard, e-mail, ...)
 - Tricky due to shielded setup

EPI Framework

Status

- Policy integration complete
 - ...largely
- Refactored framework for reasoner
 - Using different workflow representation
 - Introduced **dataset** concepts
 - Smarter compiler
- Some shortcuts taken
 - No eFLINT (hardcoded policies)
 - Static BFC (hardcoded chains)
 - Not all types of workflows supported yet
 - Containers not signed yet (any program accepted)
 - **Dumb planner** (user has to specify manually if non-trivial)

```
// Reference a dataset advertised by a domain let data1 := new Data{ name := "some_dataset" };

// The framework will automatically place the // function near the data let res1 := some_computation(data1);

// If function -> data is non-trivial, then it // will be able to automatically deduce where // to pull it from let data2 := new Data{ name := "other_dataset" };

let res2 := other_computation(data1, data2);
```

Status - eScience Conference '22

- "Exploring the Enforcement of Private, Dynamic Policies on Medical Workflow Execution"
 - **ReWorDS** Workshop 2nd Edition
 - Together with Christopher Esterhuyse
 - Not yet published (see https://enablingpersonalizedinterventions.nl when it is)

Exploring the Enforcement of Private, Dynamic Policies on Medical Workflow Execution

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medical data exchange and processing. These use cases impose safety properties, ranging from access control to legal regulations

I INTRODUCTION

is affording the separation of users' concerns, in accordance data requires Bob's written consent. with their specialized roles. For example, software developers
The last sections reflect on these contributions. We draw

a.s.z.belloum@uva.nl Abstract—We report on the ideas and experiences of adapting to formalize many notions of policy such that they have un-Brane, a workflow execution framework, for use cases involving ambiguous interpretations, both legally and operationally [5].

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This paper reports on ongoing work to adapt Brane for the exchange and computation of medical data, across orgapertaining to data privacy. Our approach emphasizes users' nizational boundaries. We describe the essential extensions to control over the extent to which they cooperate in distributed Brane to support checkers, a new, automated service, central to execution, at the cost of revealing information about their policies.

the enforcement of user policies (Section III). We then explore Index Terms—Workflow, Policy, Multi-Agent, Privacy, Safety the design space of cooperative checkers (Section IV), which use an abstract, normative policy representation (e.g., eFLINT) in communicating with agents, i.e., both human users and automated services. This makes the system easier for humans The Brane framework was originally developed by the EU to understand, and improves the efficiency of its execution. PROCESS project1 for use in exascale, high performance computing (HPC) [1]. Its focus is on enabling (data) scientists to which their policy information is exposed to other agents. execute high-level scripts, which abstract away the underlying, This is motivated by the observation that medical policies distributed workflow execution. Brane's central design tenet ultimately encode private information, e.g., processing Bob's

provide the functional building blocks applied by scientists in attention to related works (Section V) which inspire our scripts. Section II begins with an overview of Brane for HPC.

own by solving sub-problems and related problems. Finally, When automated systems compute and share data across we enumerate existing ideas and design decisions suited to ganizational boundaries, user participation is predicated on





What's next

- Fix shortcuts
 - **Not really useable** for any other use-case right now
 - Most notably:
 - Integrate eFLINT reasoner
 - Integrate BRO more tightly (make BFCs non-static)
- Create clever planner
 - Hard problem, team effort with eFLINT people (AMdEX)
- Expand user-friendliness
 - Re-add **Bakery**
 - Support for **clusters backends** (Kubernetes, Slurm, ...)
 - Support for other methods of **authentication**
 - Support for other methods of accessing data

What's next - Tutorial

- Tutorial on EPI Framework
 - Mostly in current state
- Try the framework yourself!
 - Try your hand at writing packages, workflows, execution, security, ...
 - Go into the technical details

- When? ~ First week of December
- Where? At Science Park
- More information will be shared

Conclusion

Conclusion

- First PoC is almost complete
 - Framework also ready as a PoC
 - Rosanne's use-case implemented
 - Infrastructure nearly ready
- Once we have those, we can deploy

- What's next
 - Extend **PoC** into a "real" **Use-case**
 - Make framework more mature
 - See next agenda point :)



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enablingpersonalizedinterventions.nl

github.com/epi-project/brane

wiki.enablingpersonalizedinterventions.nl (WIP)



























